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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/047,024  
Filing Date: January 15, 2002  
Appellant(s): WIELSTRA ET AL.

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For Appellant

**EXAMINER'S ANSWER**

This is in response to (1) the appeal brief filed March 24, 2006 and (2) the supplemental appeal brief filed October 26, 2006, both appealing from the Office action mailed November 4, 2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the Supplemental Brief is correct and the amendment filed on October 26, 2006, correcting claim 11, was entered.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the Supplemental Brief filed on October 26, 2006 is correct.

**(8) Evidence Relied Upon**

5,700,391	Nogami et al.	12-1997
EP 1022318 A2	JRS CORP.	07-2000

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

I. Claims 1-2 and 4-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Nogomi et al, US 5,700,391. Nogomi et al (at least example 12) discloses the combination of solution (A) and solution (L).

Solution (A) (example 1) comprises silica particles formed by sol-gel formation and having a particle size of 20 nm under basic conditions (i.e., 0.6 g of 28%, (0.005 mol) aqueous ammonia as an alkaline catalyst) and would be expected to be basic.

Solution (L) is formed from tetraethoxysilane (second organosilane), methyltriethoxysilane (first organosilane), and tetraisopropoxytitanium was mixed with N-methylpyrrolidone (10 g, MW = 99, 0.101 mol), a known organic base, forming solution (L).

Said basic silica solution (A), 30 gm, is combined with 70 gm of solution (L). Said combination would have been expected to have been basic since the no acid was added and the silica of solution (A) was formed under basic conditions.

Furthermore, to the extent the Al(NO<sub>3</sub>)<sub>3</sub> · 9H<sub>2</sub>O (MW ~ 375) is further included as a deposition inhibitor (5.6 g, 0.0.015 mol) and asserted to be an acidic component, solution (L) + (A) contains a 7 fold molar excess of combined ammonia and N-methylpyrrolidone.

Lastly, the claim required adding silica to a reaction mixture under basis conditions. The claims define a basic condition but do not define the state of the reaction mixture or the point of addition, e.g., simultaneous, pre-reaction, or post-reaction.

The instant claims as represented by claim 1 clearly read on the Nogomi et al reference. The product-by-process claims 9 and 11 clearly are anticipated and have not been shown to be distinct from the Nogomi et al reference.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

II. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nogomi et al, US 5,700,391. Nogomi et al disclose base catalyzed coatings as set forth in the above anticipation rejection.

To the extent Nogomi et al differs from the claims in the organo group of the first organosilane compound in the coating.

Nogomi et al (column 3, lines 8-22) discloses the R<sub>1</sub> group may be a 3-glycidoxypipropyl and R<sub>2</sub> may be 1-5 alkyl groups, i.e., methyl.

It would have been obvious to one of ordinary skilled in the art at the time of applicants' invention to employ the 3-glycidoxypipropyltrimethoxysilane for the exemplified methyltriethoxysilane as an obvious functional equivalent of the compounds exemplified and as a clearly contemplated species for Formula (2) component of the Nogomi et al reference. Furthermore, it would have been obvious to one of ordinary skilled in the art

at the time of applicants' invention to employ the 3-glycidoxypropyltrimethoxysilane for its known coupling or adhesive properties in forming coatings taught in the Nogomi et al reference.

III. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over JSR Corporation, EP 1 022 318 A2, taken with Nogomi et al, US 5,700,391. JSR Corp (Tables 8-10, 13, paragraphs [0146] and [0152] et seq) discloses coating compositions employing silica, organosilane and metal alkoxide.

JSR Corp differs from the claims in the characterization of the pH of the compositions as under basic conditions.

JSR Corp (paragraph [0152] to [0159] and [0162]) discloses the use zirconium, titanium and aluminum alkoxides as agents to increase the speed of curing as well as alkali compounds, basic compounds and amine compounds, which would have resulted in the method of adding under basic conditions.

JSR Corp (paragraph [0162]) further teaches the component (f), which may include the metal alkoxides, may be in the form of a combination of two or more substances.

Nogomi et al (at least example 12) discloses the combination of solution (A) and solution (L). Solution (A) (example 1) comprises silica particles formed by sol-gel formation and having a particle size of 20 nm under basic conditions and would be expected to be basic. Solution (L) is formed from tetraethoxysilane (second organosilane), methyltriethoxysilane (first organosilane), and tetraisopropoxytitanium was mixed with N-methylpyrrolidone forming solution (L). Said basic silica solution (A),

30 gm, is combined with 70 gm of solution (L). Said combination would have been expected to have been basic since the no acid was added and the silica of solution (A) was formed under basic conditions.

It would have been obvious to one of ordinary skilled in the art at the time of applicants' invention to employ basic curing agents as alkali compounds, basic compounds and amine compounds; which are known to be basic and would be expected to result in a basic composition. Said curing agents are known in the art as condensation catalyst conventionally known in the art as shown by the Nogomi et al reference for closely related coating systems.

Regarding claims 2 and 3, JSR Corp (paragraph [0152] and [0159]) discloses the metal diketonates of said zirconium, titan and aluminum metals. Regarding claims 4, 5 and 6, please see Tables 8-10 and 13 of JSR Corporation.

Regarding claims 8-11, the components are disclosed in the JSR Corp references for their use in coating substrates for the advantage resisting fouling, durability and transparency.

Nogomi et al differs from claim 3 in the use of the metal diketanoate.

JSR Corp (paragraph [0152] to [0159] and [0162]) discloses the use zirconium, titanium and aluminum alkoxides as agents to increase the speed of curing as well as alkali compounds, basic compounds and amine compounds, which would have resulted in the method of adding under basic conditions.

It would have been obvious to one of ordinary skilled in the art at the time of applicants' invention to employ the titanium diketanoates as agents to increase the

speed of curing as well as alkali compounds, basic compounds and amine compounds, which would have resulted in a suitable insulative coating taught in the Nogomi et al reference.

**(10) Response to Argument**

(1) Appellants (pages 5 and 6) assert the reference teaches the silica particles are formed in situ by the hydrolysis of solution (a), which does not contain a metal alkoxide. Solution (b) is further asserted to contain a metal alkoxide with an acid catalyst and citing column 4, lines 21 et seq, of the Nogomi et al reference.

This has not been deemed persuasive since the Nogomi et al reference discloses multiple embodiments and the acid is not exemplified in example 12.

The Nogomi et al reference (example 12) discloses two solutions. **Solution (A)** (silica particulate dispersion formed in example 1 in ammonia) **added to Solution (L)** comprising tetraisopropoxytitanium (metal alkoxide), mixture of tetraethoxysilane (formula 1), and methyltriethoxysilane (formula 2) in N-methylpyrrolidone.

Although, the Nogomi et al reference (column 4, lines 32-35) teaches the use of an acid catalyst and also an aluminum salt, the only specific mention of acid catalyst in the Nogomi et al reference is the use of nitric acid at column 10, lines 38 and 51-52 of comparative examples 2 and 3. The Nogomi et al reference teaches the hydrolyzed solution of formula (2) may contain the hydrolyzed solution of formula (1) formed in the presence of an alkaline catalyst, with no problem. Nogomi et al clearly contemplates multiple embodiments.

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The Nogomi et al reference (column 3, lines 28 et seq) does disclose the aluminum salt to improve the film hardness and does not disclose it as an acid catalyst. The Nogomi et al reference (column 3, lines 41 et seq) discloses the use of N-methylpyrrolidone as a deposition inhibitor to prevent crystallization of said aluminum salts in an amount of at least equal weight to the aluminum salt in terms of  $\text{Al}_2\text{O}_3$  and exemplifies a 7 molar excess of N-methylpyrrolidone to the aluminum salt. The Nogomi et al reference (column 4, lines 65 et seq) discloses the incorporation of the titanium alkoxide (formula 3) with the hydrolysis of the organosilane (formula 2). The Nogomi et al reference (columns 4 to 5, lines 65 to 26, particularly lines 4-8; examples 1 and 12) disclose the example 12 embodiment and state:

The hydrolyzed solution of the alkoxy silane of formula (2) may contain the hydrolyzed solution of the tetraalkoxysilane of formula (1) formed in the presence of an alkaline catalyst, with no problem.

Formula (1) refers to tetraalkoxysilane, e.g., tetraethoxysilane, (column 2, lines 39-48, example 12, and solution (L)) and formula (2) refers to alkoxy silane, e.g., methyltriethoxysilane (column 2, lines 49-56, example 12, and solution (L)).

The Nogomi et al reference further (column 5, lines 64 et seq) states the preferred hydrolyzed solution of tetraalkoxysilane contains particles formed in an alkaline catalyst, e.g., silica particles, having a particle size of 10 to 80 nm. The Nogomi et al reference does not remove the alkaline catalyst from said solution.

Furthermore and while appellants' claims do not require in situ silica formation, said claims do not exclude the formation of silica as in solution (A) of example 12,

followed by addition of colloidal solution (A) of example 1 (particle size 20 nm<sup>1</sup>), to solution (L), reaction mixture of tetraethoxysilane, methyltriethoxysilane, butylcellosolve, water, aluminum nitrate 9-hydrate, N-methylpyrrolidone, hexylene glycol, tetraisopropoxytitanium / propylene glycol slurry. The colloidal silica having a 20 nm particle size, i.e., solution (A), is formed prior to addition to a reaction mixture, i.e., solution (L) in example 12 of the Nogomi et al reference.

(2) Appellants (page 6) assert while solution (A) referred to as added to solution (L), solution (L) contains aluminum nitrate, which is known to be acidic in solution. This has not been deemed persuasive since: (i) the exhibit does not quantify said acidity, (ii) solution (L) further contains N-methylpyrrolidone, a known organic base in an amount of 7 molar excess to the molar amount of aluminum nitrate 9-hydrate, and (iii) the silica of solution (A) is basic since the silica particles are made under alkaline conditions and said base is not removed from the silica solution (A). Furthermore, the Nogomi et al reference (column 5, lines 4-8) specifically teaches the combination of the alkoxy silane of formula (2) and the tetraalkoxysilane of formula (1) can be formed under the presence of alkaline catalyst without a problem.

Appellants (pages 6 and 7) further assert that solution (b) of claim 1 requires the acid catalyst and that solution (L) contains aluminum nitrate hydrate. This has not been deemed persuasive since the Nogomi et al reference discloses multiple embodiments and the acid is not exemplified in example 12. The Nogomi et al reference (column 4, lines 32-35) teaches the use of an acid catalyst and also an aluminum salt. The only

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<sup>1</sup> See columns 7 to 8, lines 59 to 7.

specific mention of acid catalyst in the Nogomi et al reference is the use of nitric acid at column 10, lines 38 and 51-52 of comparative examples 2 and 3.

Appellants (page 7) further assert that even if the combination of solutions (A) and (L) were basic; the silica is formed *in situ*. The silica particles are formed in solution (A) and then added to solution (L). The reaction mixture requires organosilane and metal alkoxide disclosed in the Nogomi et al solution (L). Said addition is under basic conditions. Resulting from the ammonia of solution (A) and the N-methylpyrrolidone of solution (L), which are in excess and would overwhelm any acidity resulting from the aluminum nitrate.

Appellants' (page 7) characterization of the Nogomi et al reference at column 5, lines 4-8 is entirely misplaced. It is unclear what solution (1) or solution (2) appellants are referring. The cited section of the patent refers to formula (1) and formula (2). Formula (1) refers to tetraalkoxysilane, e.g., tetraethoxysilane, (column 2, lines 39-48, example 12, and solution (L)) and formula (2) refers to alkoxy silane, e.g., methyltriethoxysilane (column 2, lines 49-56, example 12, and solution (L)). Said combination may be formed with an alkaline catalyst, with no problem.

Appellants (page 7) further assert the no reason is given for the addition of the aluminum salt. This is ill founded as the Nogomi et al reference (column 3, lines 28 et seq) state the aluminum salt is added to improve the hardening of the film and the polyamide coat ability on said film.

Appellants (pages 7 and 8) assert the Nogomi et al reference (column 3, lines 32-35) disclose useful aluminum salts include aluminum chloride, aluminum nitrate,

aluminum sulfate, aluminum sulfamate, aluminum acetate, aluminum oxylate, and their basic acids. The Nogomi et al reference (column 3, lines 41 et seq) discloses the use of N-methylpyrrolidone as a deposition inhibitor to prevent crystallization of said aluminum salts in an amount of at least equal weight to the aluminum salt in terms of Al<sub>2</sub>O<sub>3</sub>. The excess amine would clearly overwhelm the acidity of the salts and show 7-fold molar excess to the aluminum salt of example 12 of the Nogomi et al reference.

Appellants (page 8) assert the reference cited in the advisory action (Research Triangle Institute) only teaches N-methylpyrrolidone as a solvent and does not mention any alkaline property. A skilled artisan having a rudimentary understanding of chemistry would recognize a pH of 8-9.5 (shown in the Research Triangle Institute reference) as alkaline.

(3) Appellants (pages 8 and 9) assert the Nogomi et al reference discloses a list of substituents for R<sup>1</sup> without providing particular guidance for any particular substituent. Appellants further assert that from the extremely large number of substituents and a lack of guidance from the Nogomi et al reference, any conclusion of obviousness must be based on hindsight.

This has not been deemed persuasive for the following reasons:

- (i) The list includes 16 substituent species specifically mentioned including 3-glycidoxypropylsilanes. This is an epoxyethersilane, which is an epoxysilane of claim 4. Therefore, the list is not deemed to be extremely large.

(ii) Furthermore, said list is not viewed in a vacuum, such as without any knowledge of the state of the art and the well-known functions of materials as defined in a technical dictionary.

(iii) One having ordinary skill in the art would have at least expected the various species to at least function in similar fashion in the Nogomi et al reference as disclosed. Some variation would further have been expected by one having ordinary skill in the art. Said disclosure provides at least a *prima facie* case of obviousness for epoxysilanes and the particular species. Further, the particular species, 3-glycidoxypropyltrimethoxysilane is encompassed in the Nogomi et al formula (2). Further, the Nogomi et al reference employs alkyltrialkoxysilanes, which would further suggest the use of trialkoxysilanes with the use of lower alkoxy groups as suitable leaving groups.

(iv) A *prima facie* case having been presented, appellants must come forward with objective evidence or reasoning to rebut said case.

(iv) Lastly, appellants have presented no evidence. Appellants assert the improper hindsight reasoning in the analysis of the prior art. The Nogomi et al reference discloses the claimed species within a single reference among a limited number of species. The only hindsight reasoning employed is reasonable hindsight, which is for a proper examination. Appellants have not rebutted the *prima facie* case of obviousness.

(4) Appellants (pages 9 and 10) assert the JSR reference provides no guidance regarding the use of an acid catalyst or a basic catalyst.

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One having ordinary skill in the art would have at least expected the catalyst to at least function in similar fashion as disclosed. Said disclosure provides at least a *prima facie* case of obviousness for the particular catalyst employed. Appellants have presented no evidence to rebut said *prima facie* case of obviousness.

Appellants assert the improper hindsight reasoning in the analysis of the prior art. The JSR reference discloses the use of alkaline catalyst within the same reference. The only hindsight reasoning employed is reasonable hindsight, which is for a proper examination. Appellants have not rebutted the *prima facie* case of obviousness.

(5) Lastly, claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over JSR Corporation, EP 1 022 318 A2, taken with Nogomi et al, US 5,700,391. Since the alternative use of acid or basic catalyst is disclosed in the art for processes of adding silica to appellants' reaction mixtures, said processes would have been *prima facie* obvious.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

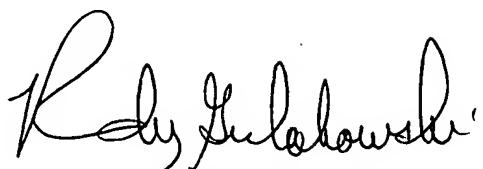
For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

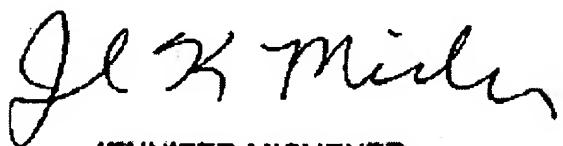


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